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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,499	03/25/2004	Hidekazu Miyairi	0756-7275	5721

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EXAMINER	
WEST, JEFFREY R	

ART UNIT	PAPER NUMBER
2857	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/808,499	MIYAIRI ET AL.	
	Examiner	Art Unit	
	Jeffrey R. West	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *See Continuation Sheet* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/18/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 1,3,11,18,26,28,32,34,37,39,42,44,45,47,50,52,53,55,58,60,69,71,74,76,77,79 and 82.

Continuation of Disposition of Claims: Claims rejected are 1,3,11,18,26,28,32,34,37,39,42,44,45,47,50,52,53,55,58,60,69,71,74,76,77,79 and 82.

DETAILED ACTION

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim Objections

2. Claims 1, 3, 11, 26, 28, 69, 71, 74, and 76 are objected to because of the following informalities:

In claim 1, line 14, to avoid problems of antecedent basis, “values corresponding” should be ---values of corrected saturations corresponding---.

In claim 1, line 16, to avoid problems of antecedent basis, “values with” should be ---values of corrected saturations with---.

In claim 3, line 14, to avoid problems of antecedent basis, “values corresponding” should be ---values of luminances corresponding---.

In claim 3, line 16, to avoid problems of antecedent basis, “values with” should be ---values of luminances with---.

In claim 11, line 8, “the_crystallinity” should be ---the crystallinity---.

In claim 26, line 14, to avoid problems of antecedent basis, “values corresponding” should be ---values of corrected saturations corresponding---.

In claim 26, line 16, to avoid problems of antecedent basis, “values with” should be ---values of corrected saturations with---.

In claim 26, line 16, to avoid problems of antecedent basis, “the crystallinity” should be ---a crystallinity---.

In claim 26, line 17, to avoid problems of antecedent basis, “having the crystallinity" should be ---having crystallinity---.

In claim 28, line 14, to avoid problems of antecedent basis, “values corresponding” should be ---values of luminances corresponding---.

In claim 28, line 16, to avoid problems of antecedent basis, “values with” should be ---values of luminances with---.

In claim 28, line 16, to avoid problems of antecedent basis, “the crystallinity” should be ---a crystallinity---.

In claim 28, line 17, to avoid problems of antecedent basis, “having the crystallinity" should be ---having crystallinity---.

In claim 69, line 4, to avoid confusion, “having a different density” should be ---having different densities---.

In claim 69, line 5, to avoid confusion, “result of a test to” should be ---result of the testing to---.

In claim 71, line 4, to avoid confusion, “having a different density” should be ---having different densities---.

In claim 71, line 5, to avoid confusion, "result of a test to" should be ---result of the testing to---.

In claim 74, line 4, to avoid confusion, "having a different density" should be --- having different densities---.

In claim 74, line 5, to avoid confusion, "result of a test to" should be ---result of the testing to---.

In claim 76, line 4, to avoid confusion, "having a different density" should be --- having different densities---.

In claim 76, line 5, to avoid confusion, "result of a test to" should be ---result of the testing to---.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1, 3, 11, 18, 26, 28, 32, 34, 37, 39, 42, 44, 45, 47, 50, 52, 53, 55, 58, 60, 69, 71, 74, 76, 77, 79, and 82 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Each of independent claims 1, 3, 26, and 28 have been amended to include the limitation of "comparing a variance obtained from relations between the approximate line and the average values with a reference value to evaluate the crystallinity of the semiconductor film having the crystallinity that has been improved".

This limitation is best supported by the specification as follows:

> Another configuration of the invention is that a visible light is irradiated on the surface of a semiconductor film of which crystallinity is improved by irradiating energy beam and the scattered light of the irradiated visible light is photographed and digitalized to obtain a digital image. When the scanning direction of the energy beam is a Y direction and a direction perpendicular to the Y direction is an X direction in the digital image, a predetermined analysis region of the digital image is divided into m in the X direction and into n in the Y direction, thus m x n basic units are sectioned. Sum of luminance of the m basic units aligned in the X direction is calculated per each of the n rows aligned in the Y direction. An approximate line of the relation of the sum of the luminance to the corresponding alignment in the Y direction is calculated, thus the crystallinity of the semiconductor film of which crystallinity is improved is tested by the fluctuation of the sum of the luminance from the approximate line.
>
> According to the invention, a visible light is irradiated on the surface of a semiconductor film of which crystallinity is improved by irradiating energy beam and the scattered light of the irradiated visible light is photographed and digitalized to obtain a digital image. When the scanning direction of the energy beam is a Y direction and a direction perpendicular to the Y direction is an X direction in the digital image, a predetermined analysis region of the digital image is divided into m in the X direction and into n in the Y direction, thus m x n basic units are sectioned. An average of luminance of each of the m basic units aligned in the X direction is calculated per each of the n rows aligned in the Y direction. An approximate line of the relation of the average of the luminance to the corresponding alignment in the Y direction is calculated, thus the crystallinity of the semiconductor film of which crystallinity is improved is tested by the fluctuation of the average of the luminance from the approximate line. (page 4, line 26 to page 5, line 17)

> FIGS. 12A and 12B show a fluctuation from an approximate line and an average luminance of an image as a whole in the graph of luminance shown two dimensionally in Y direction. (page 11, lines 4-6)

> By the relation of the average (BavYm) or the sum (BtYm) of the luminance of each Y coordinate, an approximate line is obtained (303). A fluctuation of the

data is obtained (304) by this approximate line and compared with a reference value obtained in advance, thus analysis and testing are performed (305). The reference value differs depending on the performance of a semiconductor element demanded as a final product, therefore, it may be determined by an operator appropriately.

In this method for testing, the larger the average luminance of the analysis region and the smaller the fluctuation are (closer to the approximate line), that is, the smaller the variation of the luminance in the Y direction is, the better electric characteristics can be obtained when such elements as TFTs are formed. (page 13, lines 9-18)

FIGS. 11A to 11C are graphs of the luminance shown two dimensionally in Y direction by using Method for testing 1 before obtaining an approximate line and fluctuation. The images considered as optimal by a sensory test are No. 6 or 5. On the basis of this result, it can be found from FIGS. 11A to 11C that the luminance of the image is decreased as an energy density gets smaller apart from the optimal laser irradiation energy density, while the luminance of the image increases as the energy density gets larger apart from the optimal laser irradiation energy density.

FIG. 12A is a graph on which a fluctuation obtained from an approximate line of each data shown in FIGS. 11A to B are plotted against a corresponding laser irradiation energy density of each image. The fluctuation is approximately at the lowest level around under the optimal condition found by a sensory test, thus the optimal laser irradiation energy density can be determined.

The results of Method for testing 1 is shown in Table 3.

[Table 3] (page 18, line 24 to page 19, line 7)

FIG. 12B is a graph on which an average luminance of each image is plotted against a corresponding laser irradiation energy density of each image. It can be found that the graph showing a relation between the average luminance and the laser irradiation energy density has a convex shape with a flat top indicating an approximately the best luminance of the optimal laser irradiation energy density.

This graph shows that the change in luminance is small around under the optimal condition. As it is hard to tell which is the optimal condition in this graph, the average luminance may be used in combination with the aforementioned method for obtaining the fluctuation or a method for extracting a characteristic pattern. (page 19, lines 17-25).

First, the Examiner asserts that one having ordinary skill in the art would understand that claiming a “variance” refers to the mathematical variance defined as

either a population variance $\sigma^2 \equiv \langle (X-\mu)^2 \rangle$, or a sample variance $s_N^2 \equiv \frac{1}{N}\sum_{i=1}^{N}(x_i-\overline{x})^2$. Since the cited sections do not refer to a variance, nor do they provide a measure that is consistent with the well known definition of variance, the specification fails to adequately support the new limitation of "comparing a variance".

The Examiner also asserts that the cited sections, specifically page 4, line 26 to page 5, line 17, which essentially reflects the language of the claims as originally filed, and page 11, lines 4-6 and page 13, lines 9-18, never describe comparing a variance obtained from relations between the approximate line and the average values with a reference value. What is described is obtaining an approximate line by the relation of the average of the luminance of each Y coordinate and "[a] fluctuation of the data is obtained (304) by this approximate line and compared with a reference value obtained in advance". This section only suggests that the approximate line provides an indication of the fluctuation of the data (i.e. the shape of the approximate line illustrates how the average values fluctuate). This falls short of calculating a variance obtained from relations between the approximate line and the average values.

Turning to Figures 12A and B, and their corresponding descriptions on page 19, the specification describes plotting the average luminance against an energy density and observing the shape (i.e. fluctuation) of the resulting plot in order to determine the best luminance of the optimal laser irradiation energy density. These sections also describe obtaining an approximate line and observing its shape, but again falls

short of comparing a variance obtained from relations between the approximate line and the average values with a reference value.

The Examiner does note that Table 3, as shown on page 44, does illustrate the test results wherein "average value and variation degree are shown in a parenthesis" with the variation seemingly corresponding to a Chi-squared value. There is, however, no discussion in the specification as to how this Chi-squared value is determined and whether the Chi-squared value is compared to any reference value.

For these reasons, the Examiner asserts that each of the independent claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 11, 18, 32, 34, 37, 39, 42, 44, 45, 47, 50, 52, 53, 55, 58, 60, 69, 71, 74, 76, 77, 79, and 82 are rejected under 35 U.S.C. 112, first paragraph, because they incorporate the lack of written description present in their respective parent claims.

Response to Arguments

5. Applicant's arguments with respect to claims 1, 3, 11, 18, 26, 28, 32, 34, 37, 39, 42, 44, 45, 47, 50, 52, 53, 55, 58, 60, 69, 71, 74, 76, 77, 79, and 82 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to

Applicant's disclosure.

JP Patent Application Publication No. 2000-114174 to Hiroyuki teaches manufacture of semiconductor film, manufacture of thin-film transistor, active substrate and annealing equipment.

JP Patent Application Publication No. 2002-217107 to Wada et al. teaches method of evaluating polysilicon, thin film transistor manufacturing system and method of the same.

JP Patent Application Publication No. 2000-031229 to Terada teaches inspection method of semiconductor thin film and manufacture of semiconductor thin film by use thereof.

U.S. Patent No. 6,975,386 to Tsumura et al. teaches a method for testing comprising irradiating a visible light on a surface of a semiconductor film (column 3, lines 46-53) of which the crystallinity is improved by irradiating an energy beam (column 7, lines 12-20), photo-transferring a scattered light of the irradiated visible light to form an image (column 10, lines 41-53), and analyzing regions of the image to discriminate regions of luminance (column 10, lines 1-12).

U.S. Patent No. 6,647,148 to Ozawa et al. teaches a boundary line detecting method to determine areas with differences in light reflectance on a device surface (column 5, lines 12-17) comprising a camera to take a photograph of reflected light (column 6, lines 5-9), digitizing the photographed image to make a digital image (column 7, lines 63-65), and calculating an average luminance of the digital image (column 8, lines 16-20) by a computer (column 5, lines 60-63), sectioning basic units

consisting of m rows and n columns by dividing the digital image into n in the X direction and m in the Y direction in a predetermined analysis range (column 7, lines 25-31 and 59-63 and Figure 4A), calculating/testing average values of luminances of the n basic units aligned in the X direction per each of the m rows aligned in the Y direction (column 8, lines 16-20), obtaining an approximate line from relations between the positions in the Y direction and the average values of the luminance corresponding to the positions in the Y direction, and testing the device surface using a fluctuation obtained from relations between the approximate line and the average values of the luminance (column 8, lines 3-20 and Figure 4C).

U.S. Patent Application Publication No. 2005/0041226 to Tanaka et al. teaches a method and device for exposure control comprising scanning reticle stage in an x-direction using a light source (0129, lines 1-13), receiving reflected light (0131, lines 1-7) and measuring a distribution of luminance (0321, lines 1-8) wherein the measurement is performed in a direction perpendicular to the scanning direction of the light (0322, lines 1-5).

U.S. Patent Application Publication No. 2004/0228526 to Lin et al. teaches a system and method for color characterization using fuzzy pixel classification with application in color matching and color match location comprising means for inspecting a surface of an object (0003, lines 7-12) by dividing an image into regions of interest (0038, lines 1-12) and measuring a saturation value for the image (0112, lines 1-15) that has been corrected/normalized to a range from 0 to 255 (0110, lines 8-11).

U.S. Patent Application Publication No. 2003/0142298 to Ujihara et al. teaches an inspection method and inspection system of a surface of an article through the inspection of a photographed image of its surface (0002, lines 1-3) in order to determine the illumination variations of the surface, wherein the surface is illuminated by a light source (0009, lines 1-13) such as a halogen lamp with an intensity of 20,000 to 100,000 lux (0052, lines 1-9).

U.S. Patent No. 6,861,614 to Tanabe et al. teaches an S-System for the formation of a silicon thin film and a semiconductor-insulating film interface comprising performing laser-induced crystallization using a laser pulse (column 2, lines 1-14 and column 20, line 60 to column 21, line 10).

U.S. Patent No. 5,835,614 to Aoyama et al. teaches an image processing apparatus.

U.S. Patent No. 5,091,963 to Litt et al. teaches a method and apparatus for inspecting surfaces for contrast variations.

U.S. Patent No. 6,836,532 to Durst et al. teaches a diffraction system for biological crystal screening.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eliseo Ramos-Feliciano can be reached on (571)272-7925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrey R. West/
Primary Examiner, Art Unit 2857

August 20, 2008